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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/559,743	12/07/2005	Yoshiyuki Suetsugu	28955.1062	5935

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EXAMINER	
EWALD, MARIA VERONICA	

ART UNIT	PAPER NUMBER
1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/559,743	**Applicant(s)** SUETSUGU ET AL.	
	Examiner MARIA VERONICA D. EWALD	**Art Unit** 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 4-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 4-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

13. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 16, 2008 has been entered.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4, 7 – 10, 12 – 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Isayev, et al. (U.S. 5,284,625) in view of Schembri (U.S. 5,403,415). Isayev, et al. teach an apparatus of applying ultrasonic vibration to a resin material, which applies the ultrasonic vibration to the resin material in a molten state, the apparatus comprising: a vibrator which applies ultrasonic vibration to a resin material, or a vibration transmission member which transmits the vibration of the vibrator to the resin material (item 15 – figure 1), wherein the vibrator or the vibration transmission member

is located in a channel of a flowing molten in contact with the resin material (figures 1 – 8) and the vibrator or the vibration transmission member is positioned to transmit vibration in a direction perpendicular to a flow direction of the flowing molten resin material (figures 4 – 6); and vibration transmission inhibition means is positioned to substantially inhibit members other than the resin material from being vibrated by the vibration of the vibrator or the vibration transmission member (item 52 – figure 14; column 9, lines 15 – 22); wherein the vibration transmission inhibition means is an elastic member interposed between the vibrating member or the vibration transmission member and the other member (item 52 – figure 14; column 9, lines 15 – 22); wherein the vibration transmission inhibition means is a gap interposed between the vibrating member or the vibration transmission member and the other member (figures 1 and 14); wherein a size of the gap is set to 0.05 mm or more and 0.5 mm or less (column 9, lines 40 – 43).

Isayev, et al. further teach that the vibrator or the vibration transmission member is a horn having any shape of a columnar shape, plate shape, ring shape, circular cone shape, truncated cone shape, conical shape, exponential shape, rectangular parallelepiped shape, cube shape, and a shape in which a slit cut or flange is formed on any of these shapes (figure 1); wherein the plurality of horns of arranged in series or in parallel along the channel (figures 4 – 8; column 7, lines 55 – 69); wherein the plurality of horns are arranged around the channel and the vibration is applied to the resin material from different directions (figures 4 – 8); wherein the channel is formed in one of a cylinder of an extrusion machine or an injection molding machine, a cylinder of an

extruder or a kneader, a chamber a downstream side from an outlet of the cylinder and a mold (figure 1; column 6, lines 60 – 68); wherein the resin material is one of a mixture of two or more resins and/or elastomers, and a mixture of a resin and/or an elastomer and a filler (column 3, lines 5 – 25); wherein a resin composition is produced using the apparatus (column 3, lines 5 – 25).

Isayev, et al. also teach a method of kneading, compounding and blending a resin material comprising the steps of: disposing the ultrasonic vibration applying apparatus in a channel through which the resin material having a molten state flows (figure 1; column 7, lines 5 – 15); and applying the ultrasonic vibration to the resin material which flows through the channel from a direction crossing a flow direction of the resin material at right angles (figures 4 – 8); the application of the ultrasonic vibration through the vibrator or the vibration transmission member being performed under conditions that members other than the vibrator or vibration transmission member are not substantially vibrated (figure 14).

Isayev, et al., however, do not specifically teach that vibrator or the vibration transmission member has high adhesive properties to the resin material. Fabricating a vibration transmission member such as the sonotrode tip or the horn with high adhesive properties to the resin; however, is known.

For example, Schembri teaches an ultrasonic welding horn used to melt and thereafter bond thermoplastic resin surfaces to one another. The surface of the horn has been modified to produce a uniform distribution of energy to the portions contacting the horn tip. Typical horn surfaces are flat-energy applying surfaces, which results in

uneven welding or distribution of ultrasonic energy (column 3, lines 1 – 5). The use of ultrasonic horns with flat surfaces resulted in excess plastic flow while other regions did not receive adequate energy. Therefore, to promote an affinity for the thermoplastic parts, the ultrasonic horn is modified with raised co-planar surfaces, thereby effecting distribution of the energy to the parts being contacted by the horn (column 3, lines 10 – 15). Similarly, the horn's raised surfaces may be produced with a thermoplastic film, which readily transmits energy to the surfaces being welded (column 3, lines 30 – 35). The film may also be applied by one of numerous film deposition techniques including CVD or vacuum deposition (column 3, lines 58 – 60). The horn may also be modified by etching a pattern in the surface, thereby further defining the raised surfaces and enhancing energy transfer (column 3, lines 62 – 68). Thus, Schembri teaches the modification of the ultrasonic horn surface to improve the affinity of the horn to the thermoplastic being worked upon.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the ultrasonic horn of Isayev, et al. with the surface improvement components and methods of Schembri for the purpose of improving the affinity of the horn surface to the thermoplastic, thereby effectively transmitting the energy to the regions requiring such energy, such that the plastics are bonded to one another, while minimizing any excess plastic flows, as taught by Schembri.

The Examiner is noting that claim 18 claims a resin composition (a product) made by the apparatus with the structural components of claim 1. The resin composition in and of itself *is not a novel product* and as such, the apparatus as claimed are fully capable of producing such compositions as stated in the rejection above.

Claims 1 and 4 – 5, 7, 9 – 10, 12 and 15 – 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Allan, et al. (U.S. 2006/0165832 A1) in view of Schembri. Allan, et al. teach an apparatus of applying ultrasonic vibration to a resin material, which applies the ultrasonic vibration to the resin material in a molten state, the apparatus comprising: a vibrator which applies ultrasonic vibration to a resin material, or a vibration transmission member which transmits vibration of the vibrator to a resin material (item 34 – figure 1), wherein the vibrator or the vibration transmission member is located in a channel of a flowing molten resin material in contact with the resin material (figure 1; paragraph 0010); and the vibrator or the vibration transmission member is positioned to transmit vibration in a direction perpendicular to a flow direction of the flowing molten resin material (figures 1 – 3, 5 and 7); and vibration transmission inhibition means is positioned to substantially inhibit members other than the resin material from being vibrated by the vibration of the vibrator or the vibration transmission member (item 40 – figure 1; paragraph 0039); wherein the vibration transmission inhibition means is an elastic member interposed between the vibrating member or the vibration transmission member and the other member (item 40 – figure 1; paragraph

0039); wherein a connecting portion which connects the vibrating member or the vibration transmission member to the other member is progressively formed in a position corresponding to a node portion of the vibration transmitted inside the vibrating member or the vibration transmission member, and the elastic member is interposed between the connecting portion and the other member (figures 1 and 2).

Allan, et al. also teach that the vibration transmission inhibition means is a gap interposed between the vibrating member or the vibration transmission member and the other member (figure 1); wherein the vibrator or the vibration transmission member is a horn having any shape of a columnar shape, plate shape, ring shape, circular cone shape, truncated cone shape, conical shape, exponential shape, rectangular parallelepiped shape, cube shape, and a shape in which a slit cut or flange is formed on any of these shapes (figure 1); wherein the channel is formed in one of a cylinder of an extrusion machine or an injection molding machine, a cylinder of an extruder or a kneader, a chamber a downstream side from an outlet of the cylinder and a mold (figures 1 – 5; paragraphs 0001 and 0015); wherein the resin material is one of a mixture of two or more resins and/or elastomers, and a mixture of a resin and/or an elastomer and a filler (paragraphs 0001 – 0003); wherein a resin composition is produced using the apparatus (paragraphs 0001 – 0003).

Furthermore, Allan, et al. teach a method of kneading, compounding and blending a resin material comprising the steps of: disposing the ultrasonic vibration applying apparatus in a channel through which the resin material having a molten state flows (figure 1; paragraph 0001); and applying the ultrasonic vibration to the resin

material which flows through the channel from a direction crossing a flow direction of the resin material at right angles (figures 1 – 5); the application of the ultrasonic vibration through the vibrator or the vibration transmission member being performed under conditions that members other than the vibrator or vibration transmission member are not substantially vibrated (paragraph 0039).

Allan, et al., however, do not specifically teach that vibrator or the vibration transmission member has high adhesive properties to the resin material. Fabricating a vibration transmission member such as the sonotrode tip or the horn with high adhesive properties to the resin; however, is known.

For example, Schembri teaches an ultrasonic welding horn used to melt and thereafter bond thermoplastic resin surfaces to one another. The surface of the horn has been modified to produce a uniform distribution of energy to the portions contacting the horn tip. Typical horn surfaces are flat-energy applying surfaces, which results in uneven welding or distribution of ultrasonic energy (column 3, lines 1 – 5). The use of ultrasonic horns with flat surfaces resulted in excess plastic flow while other regions did not receive adequate energy. Therefore, to promote an affinity for the thermoplastic parts, the ultrasonic horn is modified with raised co-planar surfaces, thereby effecting distribution of the energy to the parts being contacted by the horn (column 3, lines 10 – 15). Similarly, the horn's raised surfaces may be produced with a thermoplastic film, which readily transmits energy to the surfaces being welded (column 3, lines 30 – 35). The film may also be applied by one of numerous film deposition techniques including CVD or vacuum deposition (column 3, lines 58 – 60). The horn may also be modified by

etching a pattern in the surface, thereby further defining the raised surfaces and enhancing energy transfer (column 3, lines 62 – 68). Thus, Schembri teaches the modification of the ultrasonic horn surface to improve the affinity of the horn to the thermoplastic being worked upon.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the ultrasonic horn of Allan, et al. with the surface improvement components and methods of Schembri for the purpose of improving the affinity of the horn surface to the thermoplastic, thereby effectively transmitting the energy to the regions requiring such energy, such that the plastics are bonded to one another, while minimizing any excess plastic flows, as taught by Schembri.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isayev, et al. or Allan, et al. in view of Schembri. Isayev, et al., Allan, et al. and Schembri teach the characteristics previously described but do not specifically teach that the elasticity of the vibrating member relative (Eh) to the elastic member (E) is such that 0.3Eh > E.

However, this is obvious and is within the level of one of ordinary skill in the art. The elastic member used by both Isayev, et al. and Allan, et al. is a Teflon gasket, while the ultrasonic horn is metal. The modulus of elasticity is defined as the stiffness of the material or the degree to which it deforms. Teflon will deform more readily and thus, its modulus of elasticity (or measure of stiffness) is lower than the metal horn, which is

more rigid and thus, its modulus of elasticity is higher. Furthermore, depending on the metal chosen, it is obvious that at some point 0.3Eh>E.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to ensure that Eh of the vibrating member is related to E of the elastic member such that 0.3Eh>E for the purpose of ensuring that the elastic member deforms more readily, able to absorb the vibrations transmitted to it without transmitting such vibrations to the other member, which in turn ensures that only the resin is vibrated.

Claim 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isayev, et al. or Allan, et al., in view of Schembri and further in view of Rice (U.S. 5,269,860). Isayev, et al., Allan, et al. and Schembri teach the characteristics previously described but do not specifically teach that the adhesive properties improver is maleic anhydride or a composition of malefic acid.

In a method to ultrasonically bond thermoplastic to fibers, Rice teaches the use of an ultrasonic horn to weld thermoplastic sheets to a fibrous textile surface. The ultrasonic horn used has a tip surface, which is shaped to follow the contour of the sheet being bonded (column 4, lines 20 – 30). The contour may be curved, round, solid or tubular (column 4, lines 20 – 30). Furthermore, Rice teaches that the use of maleic anhydride-based polymers (amorphous crystals) effectively transmit the ultrasonic energy due to their random molecular arrangement and thus, are appropriate to use when bonded to a non-thermoplastic fiber (column 2, lines 60 – 69; column 3, lines 1 –

10, 20 – 26). This suggests that the surface of the vibration transmission member or vibrator be subjected to surface treatment wherein the treatment is the formation of grooves or a concave/convex surface and wherein the adhesive improver is maleic anhydride.

Thus, it would have been obvious to one of ordinary skill in the art to modify or improve the surface of the ultrasonic horn of Isayev, et al. or Allan, et al. with the components or methods of Schembri, such that it is subjected to surface treatment or an adhesive improver such as maleic anhydride for the purpose of readily and effectively transmitting the ultrasonic energy to the resin.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isayev, et al. or Allan, et al. in view of Schembri and further in view of Hansen (U.S. 3,971,315). Isayev, et al., Allan, et al. and Schembri teach the characteristics previously described but do not teach that the resin composition is produced by mixing two or more thermoplastic resins and/or elastomers, wherein an interface is formed between the mixed thermoplastic resins, and one thermoplastic resin oozes like a feather into the other thermoplastic resin in the interface.

It is however, obvious that the apparatus is capable of producing such a composition, depending on the configuration of the extruder or injection molding apparatus. Furthermore, Allan, et al. state that ultrasonic vibration is known to improve the flow and distribution of the molding or resin material (paragraph 0002).

In addition, such resin compositions as claimed are also known. For example, Hansen teaches the formation of a thermoplastic resin composition, wherein two or more resins are placed in a mold and "ooze" or infiltrate one into the other at the resin interface (column 6, lines 15 – 30).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the apparatus of Isayev, et al., or Allan, et al. with the modification as taught by Schembri, such that a resin composition is produced wherein one resin oozes into the other like a feather at the interface depending on the final product desired and chosen by the manufacturer.

The Examiner is also noting that claim 19 is a product-by-process claim. As such, regardless of how the product is made, the product, being a resin composition, is a known product and thus, is not in and of itself novel. Per MPEP 2113, "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985)

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isayev, et al. or Allan, et al. in view of Schembri and further in view of Takubo, et al. (U.S. 4,863,653).

Isayev, et al., Allan, et al. and Schembri teach the characteristics previously described but do not teach that the resin material includes maleic anhydride or a resin modified by maleic anhydride.

However, such resins are known adhesive resins and are further known to be resins which are extruded to form thermoplastic products.

For example, Takubo, et al. teach an extruder used to fabricate thermoplastic products, wherein typical resin materials used include a graft copolymer of maleic anhydride and polyolefin resins (column 4, lines 5 – 10).

Thus, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the apparatus of either Isayev, et al. or Allan, et al. with the components and methods of Schembri, further configured such that the resin includes maleic anhydride or a resin modified by maleic anhydride because such resins are known materials used to produce thermoplastic products, as taught by Takubo, et al.

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isayev, et al. or Allan, et al. in view of Schembri and further in view of Rabeneck, et al. (U.S. 4,289,569). Isayev, et al., Allan, et al. and Schembri teach the characteristics previously described but do not teach that the surface of the vibration transmission member has been treated through sand-blasting.

Such a technique, however, is a known technique used to knurl or roughen an ultrasonic horn surface. For example, Rabeneck, et al. teach an ultrasonic horn used for

welding, wherein the horn is modified with a roughened surface. The roughened finish is produced via sand-blasting or other known techniques (column 8, lines 40 – 47). Furthermore, the roughened surface overcomes the tendency of the feedstock to spread laterally. If the horn remains with a smooth surface, the feedstock strands would displace laterally instead of consolidating. Thus, the rough or knurled surface of the horn adheres to the feedstock strands, ensuring the strands are consolidated into the seal nugget (column 8, lines 45 – 51).

Thus, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to configure the apparatus of Isayev, et la. or Allan, et al. with the components or methods of Schembri, further configured such that the ultrasonic horn is treated via sand-blasted as taught by Rabeneck, et al. for the purpose of producing a knurled or roughened surface, which adheres to the feedstock being welded.

References of Interest

15. Torigai (U.S. 3,619,429), Dinzburg (U.S. 5,955,035), and Schembri (U.S. 5,599,411) are cited of interest to show the state of the art. Torigai teaches an extrusion apparatus, wherein a coating is extruded in a continuous stream on a weld wire or rod. Ultrasonic horns or sonotrodes are disposed on one end of the apparatus to ensure that the particles are dispersed uniformly and thus, the wire is coated uniformly. The horn is disposed in a sleeve, which shields the extrusion head from any vibration (column 6,

lines 45 – 60). Dinzburg teaches an apparatus for devulcanizing cross-linked elastomers, wherein an ultrasonic horn is disposed in the elastomer channel, though perpendicular to the flow. Schembri teaches the modification of an ultrasonic horn to improve the welding of thermoplastic parts. The ultrasonic horn is modified such that it includes raised co-planar portions on its surface.

Response to Arguments

16. Applicant's arguments, see pages 7 – 8, filed October 16, 2008, with respect to the rejection(s) of claim 1 have been fully considered and are persuasive. Thus, the rejections of claim 1 and their respective dependent claims as obvious over either Isayev, et al. or Allan, et al. in view of Archer has been withdrawn.

The Examiner agrees that the primary references do not teach a vibration transmission member with high adhesive properties and also agrees that though Archer may teach a titanium horn, Archer does not specifically teach the horn's adhesive properties to a resin.

Thus, the Examiner cites the primary references of Isayev, et al. and Allan, et al. in view of the new reference of Schembri. Schembri teaches an ultrasonic horn wherein the horn surface has been modified with raised co-planar portions. Previous horns with smooth surfaces did not adequately transmit the vibration to all portions of the thermoplastic parts and thus, either underwelding or overwelding occurred, or excess plastic would overflow. To remedy the poor transmission of energy, Schembri teaches a

modification of the horn, wherein the horn is improved with raised co-planar portions, which is deposited via etching, CVD or other known techniques.

Similarly, with respect to new claim 21, Rabeneck, et al. teach an ultrasonic horn with a knurled surface to improve its adherence to a feedstock, thereby improving the feedstock consolidation. The knurled surface is produced via sand-blasting.

Conclusion

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARIA VERONICA D. EWALD whose telephone number is (571)272-8519. The examiner can normally be reached on M-F, 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MVE

/Maria Veronica D Ewald/
Examiner, Art Unit 1791